

DRAFT

NOAA SMALL BOAT PROGRAM

COXSWAIN BASIC EDUCATION STANDARD

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BACKGROUND AND DISCUSSION

Fundamental Principles of Marine Operations Training

1. Honor the mariner.
2. Share commitment.
3. Seek a quality approach.
4. Exceed the minimum when possible.
5. Value, respect, and learn from experience.
6. Encourage professional development through continuing education.
7. Share information and lessons learned.

Minimum Operator Training Requirements of NAO 217-103

Approved operator training for Class II and smaller boats in NOAA Administrative Order 217-103, "Management of NOAA Small Boats" is currently required to meet the education standards of the National Association of State Boating Law Authorities (NASBLA) National Boating Education Standards. NASBLA developed its minimum content for boating education courses more than a decade ago. These standards have served as a guide for state, non-profit and commercial providers to follow in developing boating education materials. In July of 1998, NASBLA contracted with a research team anchored at the Pennsylvania State University to evaluate the existing guidelines and develop a new minimum "standard of care" for boating education. Approved September 22, 1999, this new set of standards is intended to prescribe the minimum body of knowledge necessary to effect safe, legal, and enjoyable boating. In addition, the proposed standard of care is predicated on reducing risk in recreational boating based on empirical accident and boating violation statistics. These standards provide the standard of care for recreational boater education curriculum.

Operating boats in support of marine research involves many unique associated risks. Most of these risks are not even contemplated by the recreational boater and therefore are not included in the NASBLA boater education standards. For instance, recreational boaters typically do not:

- operate boats from ships
- run boats through surf and conduct beach landings,
- handle gear over the side of their boats with cranes, A-frames, davits, or booms,
- wrestle sea lions, tag seals, or conduct biopsy sampling
- modify their boats to accomplish a specific mission,
- install high tech survey gear,
- work in harsh weather conditions,
- engage in boardings, patrols, and law enforcement, or
- conduct field camp resupply/cargo missions.

These aspects of marine research, combined with the frequent inability of private sector training vendors to provide applicable, valuable, and timely training that meets the demanding schedules of many field activities lend weight toward the argument for establishing in-house NOAA training.

Furthermore, Vice Admiral Lautenbacher has provided support for this initiative in his Memorandum of December 27, 2003 that directs NMAO to lead the development of a Universal NOAA Coxswain Training/Qualification Protocol. Certain technical or specialty marine operations training may be contracted.

NOAA Senior Field Managers, in consultation with field personnel, must identify the operations that are conducted under their areas of responsibility that pose a considerable, unaddressed risk and seek abatement strategies to minimize risk. The Coxswain Basic Education Standard is intended to provide a fundamental and comprehensive level of knowledge for coxswains, helmsmen, crew, scientists, and managers. This fundamental level of training is a critical aspect in risk identification and abatement. Where a topic in this Education Standard is relevant to the risks encountered in a specific NOAA Activity, an in depth curriculum and training program can be presented.

In addition to meeting the minimum qualification standard to operate a small boat (Class II and smaller), field personnel and managers who successfully complete a course based on the Coxswain Basic Education Standard should be able to recognize, correct, or avoid unacceptable risks and excessively risky situations before an accident occurs. As the title of this standard indicates, this is a basic education standard and does not qualify a new, inexperienced coxswain to conduct operations involving advanced boat handling skills.

The Universal Standard of Marine Operations Training has been derived from, and based on:

- coarse assessment of common operational risks in NOAA,
- review of factors contributing to NOAA boat accidents,

- NASBLA National Boating Education Standards,
- Department of Treasury Federal Law Enforcement Training Center,
- United States Coast Guard Boat Crew Seamanship Manual,
- Department of the Interior Motorboat Operator Certification Course, and
- Canadian Coast Guard Boat Crew Training Manual

Applicability to Current NOAA Coxswains

Performance, safety record, and experience criteria should be developed to determine the proficiency of current NOAA Coxswains and whether or not they have met or surpassed this basic education standard. It is expected that in most NOAA activities the assessment criteria (whatever they may be) will be met and the current NOAA Coxswains will be found qualified for the operations that they have been conducting. Assessment should be conducted only by Designated Examiners. All new coxswains in NOAA, or cooperating agency coxswains should be expected to provide proof of meeting or exceed this minimum standard.

Coxswain Basic Education Standard

1. NAUTICAL NOMENCLATURE
 - a. Parts of Boats
 - b. Boxing the Compass and Relative Bearings
 - c. Lines, Ropes, Knots
 - d. Hardware
 - e. Motion of Boats
 - i. Linear
 - ii. Rotational
 - f. Persons and Authority/Responsibility
 - i. Coxswain
 - ii. Helmsman
 - iii. Crew
 - iv. Scientist
 - v. Crew/Scientist
 - g. Navigation and Boat Handling
2. THE BOAT
 - a. Boat Registration Requirements
 - i. Public Vessel Exemption
 - (1) USCG and State Authority
 - (2) Purpose
 - (3) What it isn't
 - ii. Measurement
 - iii. Numbering
 - (1) Documentation vs. Registration

- (2) NOAA Registration Card
 - (3) NAO Required Information
 - (a) HIN
 - (b) LOA
 - (c) Propulsion
 - (d) Responsible Person
 - (e) ...
 - (f) Additional Information
 - iv. Uses of Registration Data
 - (1) Legal Requirement
 - (2) Resource Estimation
 - (3) Homeland Security/Port Security Initiatives
 - (4) Cooperation w/ Other Agencies
 - b. Boat Identification
 - i. Color Schemes
 - ii. Uniform Corporate Image
 - iii. Exceptions to Identification Requirements
 - iv. Bristol Fashion/Appearances
- 3. EQUIPMENT REQUIREMENTS
 - a. Minimum Equipment
 - i. 46 CFR
 - ii. 33 CFR
 - b. DOES NOT CONSIDER Research Motorboat RISK
 - c. PFDs
 - i. Serviceability
 - ii. Lights/Whistles and Boundary Line (46 CFR 28.110)
 - iii. Use Requirement
 - (1) NOAA requirement from Koss fatality findings
 - (2) "Think Safe" Pamphlet/Risk
 - (3) Buoyancy
 - (4) Designs
 - iv. Carriage Requirement
 - d. Fire Extinguishers
 - i. Number and Type Required
 - ii. Serviceability & Inspection
 - (1) CO2
 - (2) Dry Chem
 - (3) Halon
 - (4) Foam
 - (5) Water
 - iii. Accessibility
 - iv. Extinguisher Class
 - e. Inboard and I/O Gas Engine Back Fire Flame Arrestor
 - f. Ventilation
 - g. Navigation Lights and Day Shapes
 - i. Display
 - ii. Interpretation
 - iii. Visibility
 - iv. RIAM

- v. Towing
 - vi. Fishing
 - vii. Trawling
 - h. Sound Signaling Equipment
 - i. Horn, Whistle, Bell
 - i. Risk Abatement and Additional Gear/Outfitting Requirements
4. TRIP PLANNING
- a. Marine Weather and Environmental Hazards
 - i. Marine Weather Accuracy
 - ii. Atmospheric Pressure
 - iii. Waves - Wind, Fetch, Duration
 - iv. Swells and Surf
 - v. Water Temperature
 - vi. Storms, Hurricanes
 - vii. Lighting and Lightning Protection
 - viii. Fog, Rain, Sleet, Snow, Icing
 - ix. Tides, Tide Rips, and Currents
 - x. Rivers, Bars, Rapids, White water, and Currents
 - xi. Surf
 - xii. Marine Geology/Bathymetry
 - xiii. Oceanographic, Meteorological, and Geographic Phenomena
 - (1) Willawas/Orographic Effects
 - (2) North Wall/water mass and air mass interactions
 - (3) Standing Waves/wind and current effects
 - b. Navigational Hazards
 - i. Submerged Ruins
 - ii. Dams
 - iii. Deadheads/Debris
 - iv. Overhead cables
 - v. Bridges
 - vi. Other Vessel Traffic
 - vii. VTS, Separation Schemes, and Moorings/Anchorages
 - c. Float Plans
 - i. Minimum information in NAO
 - ii. Filing requirements
 - iii. When to notify the USCG
 - d. Underway Check Off List
 - i. Through-Hull Fittings
 - ii. Bilge system
 - iii. Fuel system
 - iv. Electrical System
 - v. Hydraulic System
 - vi. Standing Rigging
 - vii. Running Rigging
 - viii. Running Gear (Prop, outdrive, shaft, struts)
 - ix. Engine

- x. Nav Lights
- e. Trailering
 - i. Trailering Check off
 - (1) Trailer is registered
 - (2) Brake and Directional lights operable
 - (3) tires inflated
 - (4) bearings greased
 - (5) safety chains in place
 - (6) surge brakes
 - (7) Secure boat and gear
 - ii. Road Handling factors
 - (1) Stopping
 - (2) Acceleration
 - (3) Cross Winds
 - (4) Passing/Length
 - iii. At the Boat Ramp
 - (1) Overhead Clearance
 - (2) Ramp grade, condition, and growth
 - (3) Backing
 - (4) Launch Check Off
 - (5) Safety Briefing w/ Passengers
 - iv. Retrieving
 - (1) Positioning on Trailer
 - (2) Hauling
 - (3) Secure
 - (4) Maintenance
 - (5) Wash down

5. MARINE ENVIRONMENT

- a. NOAA Mission/Lead By Example
- b. Garbage
 - i. Display of Placards
 - ii. Waste Management Plan
 - iii. Plastic
- c. Aquatic Nuisance Species
- d. Toilet and Sewage Handling
- e. Engine Emissions
- f. Toxic and Hazardous Chemicals and Reactions
- g. Oily Bilges
- h. Spills

6. SEAMANSHIP

- a. Types and Characteristics of Line, Cable and Wire
- b. Inspection, Maintenance and Stowage
- c. Breaking Strength of Line, Hardware, Hooks
- d. Knots, Splices, and Stoppers
- e. Line and Wire Rope Handling
- f. Rigging Tows
- g. Deck Fittings, Belaying to a Cleat, Bitt, Crucible Bitt
- h. Water Tight Integrity

- i. Deploying Gear
- j. Deck Hazards

7. OPERATION

- a. Operational Risk Management
 - i. MCO3500.27
 - ii. USCG Risk-Based Decision Making
 - iii. Team Coordination and Risk Management
- b. Coxswain, Helmsman, Crew, Trainee
 - i. Hierarchy
 - ii. Skills
 - iii. Endorsements
 - iv. Continuing Education
 - v. Qualification Standards
- c. Coxswain and Crew Endurance, Readiness, and Fatigue
 - i. STCW Work Hours and Rest Periods
 - ii. Alcohol and Drugs
 - iii. Environmental Factors
 - iv. Boat Design Factors
 - v. Mission Requirements
- d. Coxswain Responsibilities
 - i. Safety of Boat and Crew
 - ii. Safety of Navigation/Navigation Rules
 - (1) Rule 2 - Rule of Responsibility (General Prudential Rule)
 - (2) Rule 3 - Definitions
 - (a) Restricted in Ability to Maneuver
 - (b) Fishing
 - (c) Trawling
 - (d) Underwater Operations
 - (3) Rule 4 - Applicability
 - (4) Rule 5 - Proper Lookout (RADAR)
 - (5) Rule 6 - Safe Speed
 - (6) Collision Avoidance Rules (RADAR)
 - (7) Operation within narrow channels
 - (8) Sound Signals
 - (9) Navigation Light and Shape Display and Recognition
 - (10) Restricted Visibility
 - (11) Visual Distress
 - (12) Rendering Assistance
 - iii. Accomplishment of Mission
 - (1) Situational Awareness
 - (2) Blurring of Coxswain/Scientist duties
 - iv. Homeland Security Measures and Suspicious Activity
 - v. Research Permits
- e. Stability
 - i. Boat Loading and Capacity
 - ii. Free Surface and Tanks
 - iii. Heeling Moments

- (1) Weight Handling
 - (2) External Dynamic Forces
 - (3) Tow Points and Tripping
- f. Navigation
 - i. Compasses
 - (1) Magnetic Compass
 - (2) Fluxgate Compass
 - (3) GPS Compass
 - (4) Gyro Compass
 - (5) Deviation, Variation, Compass Error,
 - (6) Compass Adjustment
 - ii. Coordinate System
 - iii. Piloting
 - (1) Distance, Speed, Time
 - (2) Set and Drift
 - (3) RADAR
 - (4) GPS
 - (5) LORAN
 - (6) River Sailing
 - (7) DR, LOP, Fix, Track Lines
- g. Chart Interpretation
 - i. ATONS
 - ii. Chart Information
 - iii. Age of Survey and Dynamic Coasts
 - iv. Chart 1
 - v. Corrections
- h. Nautical Pubs
 - i. Coast Pilot
 - ii. Tide Tables
 - iii. NtoM
 - iv. Local NtoM
 - v. Light List
 - vi. ...
- i. Fuel, Range, HP, and GPH
 - i. Speed vs HP
 - ii. Speed vs RPM
 - iii. Speed vs GPH
 - iv. Weather, Bottom Fouling, and Loading vs GPH
- j. Boat Handling
 - i. Forces
 - (1) Environmental
 - (2) Vessel
 - (3) Shaft, Prop, Rudder
 - (4) O/B and I/Os
 - (5) Jet Drives
 - ii. The Controls
 - iii. Basic Skills
 - (1) Steering a Course
 - (2) Stopping
 - (3) Asymmetric Propulsion (twin-screwing)

- (4) Docking and Mooring
 - (5) Anchoring
 - (6) Maneuvering in Current
 - (7) Maneuvering in High Winds
 - (8) Maneuvering in Heavy Weather
 - (9) Maneuvering alongside another vessel
- iv. Advanced Skills
 - (1) Station Keeping
 - (2) Steering Transects
 - (3) Dive Tending
 - (4) Towing
 - (5) Trawling
 - (6) Fishing
 - (7) Surf Ops/Beach Landings
 - (8) Shore Landings/Intentional Grounding
 - (9) Marine Mammal Ops
 - (10) Moorings
 - (11) Ship Ops
 - (12) Night Ops

8. EMERGENCY/DISTRESS/SURVIVAL

- a. Accident Reporting
 - i. NOAA boat accidents
 - ii. Witness to other Accidents
- b. Rendering Assistance
- c. Emergency Procedures
 - i. Capsizing
 - ii. Man Overboard
 - iii. Fire
 - iv. Unintentional Grounding
 - v. Collision
 - vi. Sinking
- d. Distress Communications
 - i. Signals/Pyrotechnics
 - ii. Radio Comms
 - iii. EPIRB, PLB
 - iv. SART
- e. Survival
 - i. Common Strategies
 - ii. Wilderness
 - iii. Tropical Waters
 - iv. Cold Waters/Hypothermia
 - v. Open Ocean
 - vi. Sea Water Poisoning

9. PERSONAL WATER CRAFT

- a. Precautions when Operating in Vicinity of PWC
- b. Handling Characteristics
- c. Potential Applicability to Research Ops
- d. Reboarding

10. RADIO COMMUNICATIONS

- a. FCC Licensing Requirements
 - i. Individual License
 - ii. Ship Station Licenses
 - iii. Call Sign and MMSI
 - iv. FCC Forms and FCC Rules
- b. DSC/GMDSS
- c. NAVTEX
- d. EPIRB
- e. RADAR/SART
- f. INMARSAT and Commissioning
- g. Iridium
- h. CBs and Cell Phones
- i. Phonetic Alphabet
- j. Phraseology
- k. Routine, Safety, Urgency, and Distress Comms

11. ENGINEERING, MATERIAL CONDITION, and YOUR BOAT

- a. Know your boat, be your boat (Attaining Zen Mastery of Boats)
- b. FBS - Free Boat Syndrome
- c. Impediments to High Engineering and Material Condition Standards
 - i. Experience in Uninspected Vessels
 - ii. Awareness and Knowledge
 - iii. Lack of resources
- d. Standards for Repair/Construction/Modification
 - i. ABYC
 - ii. NMEA
 - iii. CFR Subchapters C, F, I, J, L, S, T, U
- e. Contracted Maintenance and Repair Shop Standards
 - i. OEM Certifications
 - ii. ABYC Certifications
 - (1) Composite Fabricators
 - (2) Diesel Engines and Support Systems
 - (3) Electrical Systems Certification
 - (4) Standards Accreditation
 - iii. NMMA
 - iv. CFA
- f. Modification of Boats
 - i. Closed Cell Foam Flotation
 - ii. Reinforcement
 - iii. Relieving Stress
 - iv. Rails, Guards, and Handrails
 - v. Naval Architecture and Marine Engineering services
- g. Material Condition
 - i. Corrosion
 - (1) Galvanic
 - (2) Stray Current

- (3) Chemical
 - (4) Bonding
 - h. Water Tight Integrity
 - i. Cracking, Delamination and Hull Strength
 - ii. Hull Preservation
 - iii. UV deterioration
 - iv. Delignification
 - v. Penetrations and Closed Cell Foam Saturation
 - i. Wiring Standards and Common Pitfalls
 - j. Vital System Piping Standards and Common Pitfalls
 - i. Fuel
 - ii. Cooling Water
 - iii. Bilge
 - k. Other Common Boat System Pitfalls
 - i. Hydraulic Systems
 - ii. Mission Systems (CTD wiring)
 - l. Preventive Maintenance Guidelines
 - i. Propulsion
 - ii. Fuel System
 - iii. Cooling system
 - iv. Weight Handling
 - v. Hour Meter
 - vi. ...
 - m. Fuels
 - i. Diesel Fuel Hazards/Precautions
 - ii. Gasoline Fuel Hazards/Precautions
 - iii. Emergent Fuel Technology
- 12. TROUBLESHOOTING in the Field
 - a. Electrical
 - b. Propulsion
 - c. Temporary Repairs
- 13. CONTINUING MARITIME EDUCATION
 - a. Continuing Education
 - i. Rationale
 - ii. Many Coxswain Basic Education Standards are entire fields of professional study unto themselves.
 - iii. Trends in Marine Safety and Regulation
 - b. State Specific Laws
 - i. N/A to Public Vessels
 - ii. Generally N/A to NOAA boat ops
 - iii. Should at least review and be aware